GROUND-WATER CONDITIONS IN UTAH, SPRING OF 1999

By

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INTRODUCTION

This is the thirty-sixth in a series of annual reports that describe ground-water conditions in Utah. Reports in this series, published cooperatively by the U.S. Geological Survey and the Utah Department of Natural Resources, Division of Water Resources and Division of Water Rights, provide data to enable interested parties to maintain awareness of changing ground-water conditions.

This report, like the others in the series, contains information on well construction, ground-water withdrawal from wells, water-level changes, precipitation, streamflow, and chemical quality of water. Information on well construction included in this report refers only to wells constructed for new appropriations of ground water. Supplementary data are included in reports of this series only for those years or areas which are important to a discussion of changing ground-water conditions and for which applicable data are available.

This report includes individual discussions of selected significant areas of ground-water development in the State for calendar year 1998. Most of the reported data were collected by the U.S. Geological Survey in cooperation with the Utah Department of Natural Resources, Divisions of Water Rights and Water Resources.

The following reports deal with ground water in the State and were printed by the U.S. Geological Survey or by cooperating agencies from May 1998 through April 1999:

Ground-water conditions in Utah, spring of 1998, by D.D. Susong, C.B. Burden, and others, Utah Division of Water Resources Cooperative Investigations Report No. 39.

Hydrology of the Bonneville Salt Flats, northwestern Utah, and simulation of ground-water flow and solute transport in the shallow-brine aquifer, by J.L. Mason, and K.L. Kipp, Jr., U.S. Geological Survey Professional Paper 1585.

Ground-water hydrology and simulated effects of development in the Milford Area, an arid basin in southwestern Utah, by J.L. Mason, U.S. Geological Survey Professional Paper 1409-G.

Hydrology and snowmelt simulation of Snyderville Basin, Park City, and adjacent areas, Summit County, Utah, by L.E. Brooks, J.L. Mason, and D.D. Susong, Utah Department of Natural Resources Technical Publication No. 115.

Water resources in the area of Snyderville Basin and Park City in Summit County, Utah, by D.D. Susong, L.E. Brooks, and J.L. Mason, U.S. Geological Survey Fact Sheet 099-98.

Selected hydrologic data for the central Virgin River basin area, Washington and Iron Counties, Utah, 1915-97, C.D. Wilkowske, V.M. Heilweil, and D.E. Wilberg, U.S. Geological Survey Open-File Report 98-389.

UTAH'S GROUND-WATER RESERVOIRS

Small amounts of ground water can be obtained from wells throughout most of Utah, but large amounts that are of suitable chemical quality for irrigation, public supply, or industrial use generally can be obtained only in specific areas. The areas of ground-water development discussed in this report are shown in figure 1 and listed in table 1. Relatively few wells outside of these areas yield large amounts of ground water of suitable chemical quality for the uses listed above, although some of the basins in western Utah and many areas in eastern Utah have not been explored sufficiently to determine their potential for ground-water development.

About 2 percent of the wells in Utah yield water from consolidated rock. Consolidated rocks that yield the most water are lava flows, such as basalt, which contain interconnected vesicular openings, fractures, or

permeable weathered zones at the tops of flows; limestone, which contains fractures or other openings enlarged by solution; and sandstone, which contains open fractures. Most of the wells that penetrate consolidated rock are in the eastern and southern parts of the State in areas where water cannot be obtained readily from unconsolidated deposits.

About 98 percent of the wells in Utah yield water from unconsolidated deposits. These deposits may consist of boulders, gravel, sand, silt, or clay, or a mixture of some or all of these materials. The largest yields are obtained from coarse materials that are sorted into deposits of uniform grain size. Most wells that yield water from unconsolidated deposits are in large intermountain basins that have been partly filled with rock material eroded from the adjacent mountains.

SUMMARY OF CONDITIONS

The total estimated withdrawal of water from wells in Utah during 1998 was about 747,000 acre-feet (table 2), which is about 56,000 acre-feet less than the total for 1997 and 115,000 acre-feet less than the average annual withdrawal for 1988-97 (table 3). The decrease in withdrawals mostly resulted from decreased irrigation usage. The total estimated withdrawal for irrigation was about 429,000 acre-feet (table 2), which is 40,000 acre-feet less than in 1997. Withdrawal for industrial use was about 61,000 acre-feet, which is about 1,000 acre-feet more than in 1997. Withdrawal for public supply decreased about 16,000 acre-feet to about 194,000 acre-feet. Withdrawal for domestic and stock use was about 63,000 acre-feet, which is about equal to the withdrawal for 1997.

Ground-water withdrawal decreased from 1997 to 1998 in 11 of the 16 areas of ground-water development discussed in this report (table 2). Withdrawal in the Milford area and Utah and Goshen Valleys decreased about 11,000 and 10,000 acre-feet, respectively, the largest decreases among the significant ground-water development areas (fig. 1). Withdrawal increased about 3,000 acre-feet in Parowan Valley and 2,000 acre-feet in Cedar Valley, Iron County, and the Central Virgin River area. The 1998 withdrawal was less than the average annual withdrawals for 1988-97 in 12 of the 16 areas (tables 2 and 3).

The amount of water withdrawn from wells is related to demand and availability of water from other sources, which, in turn, are partly related to local climatic conditions. Precipitation during calendar year 1998 at 27 of 28 weather stations included in this report (National Oceanic and Atmospheric Administration, 1998) was greater than the long-term average. The largest positive departure from average in 1998 was the 8.81 inches recorded at Tooele, and the only negative departure from average was the 3.10 inches recorded at Bluff, in southeastern Utah.

A total of 651 wells were constructed for new appropriations of ground water in 1998, as determined by the Utah Division of Water Rights (table 2). This is 106 fewer wells than was reported for 1997. In 1998, 132 large-diameter wells (12 inches or more) were constructed for new appropriations of ground water (table 2). These are principally for withdrawal of water for public supply, irrigation, and industrial use.

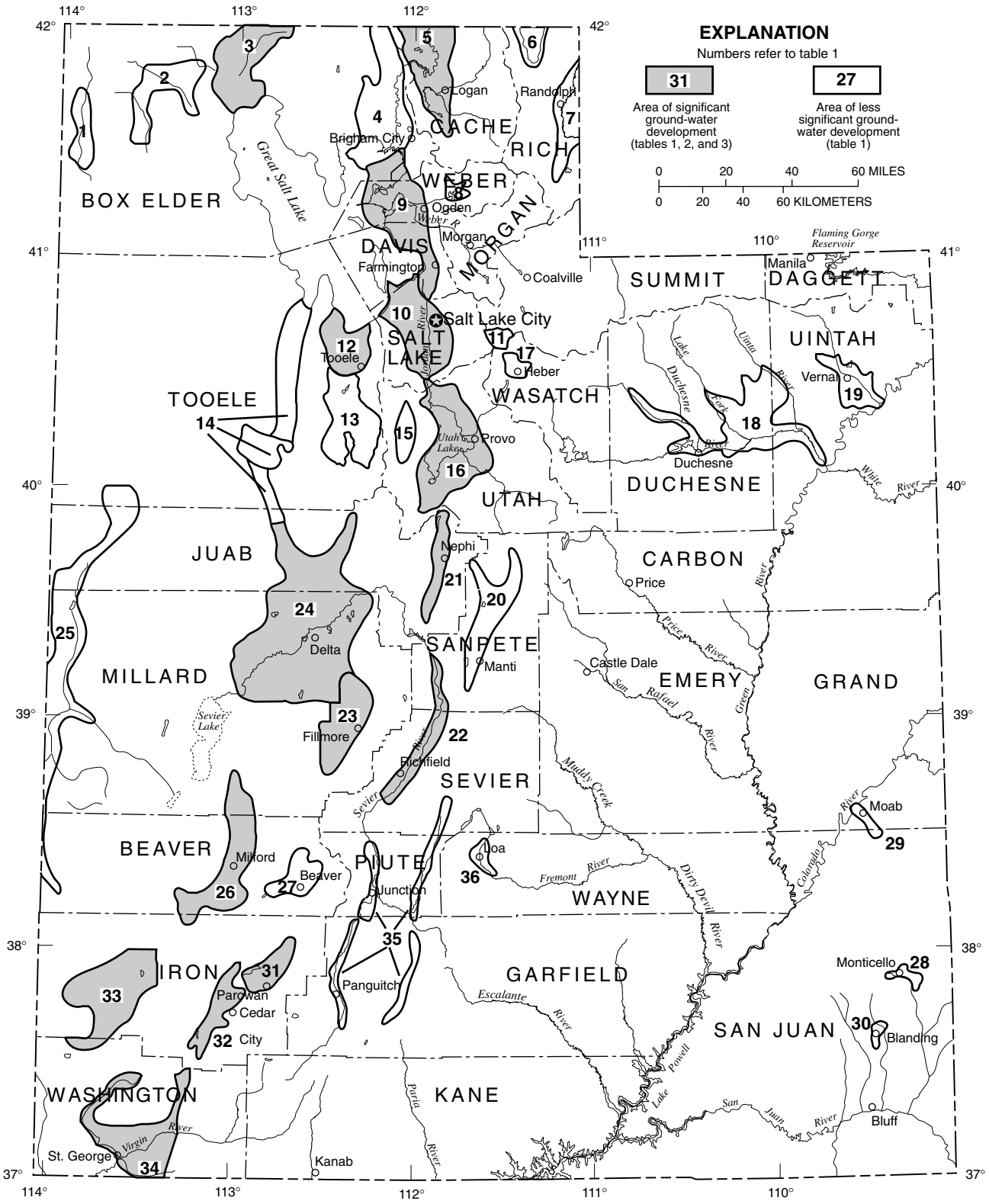

Figure 1. Areas of ground-water development in Utah specifically referred to in this report.

Table 1. Areas of ground-water development in Utah specifically referred to in this report

Number in figure 1	Area	Principal types of water-bearing rocks
1	Grouse Creek Valley	Unconsolidated.
2	Park Valley	Do.
3	Curlew Valley	Unconsolidated and consolidated.
4	Malad-lower Bear River Valley	Unconsolidated.
5	Cache Valley	Do.
6	Bear Lake Valley	Do.
7	Upper Bear River Valley	Do.
8	Ogden Valley	Do.
9	East Shore area	Do.
10	Salt Lake Valley	Do.
11	Park City area	Unconsolidated and consolidated.
12	Tooele Valley	Unconsolidated.
13	Rush Valley	Do.
14	Dugway area	Do.
	Skull Valley	Do.
	Old River Bed	Do.
15	Cedar Valley, Utah County	Do.
16	Utah and Goshen Valleys	Do.
17	Heber Valley	Do.
18	Duchesne River area	Unconsolidated and consolidated.
19	Vernal area	Do.
20	Sanpete Valley	Do.
21	Juab Valley	Unconsolidated.
22	Central Sevier Valley	Do.
23	Pahvant Valley	Unconsolidated and consolidated.
24	Sevier Desert	Unconsolidated.
25	Snake Valley	Do.
26	Milford area	Do.
27	Beaver Valley	Do.
28	Monticello area	Consolidated.
29	Spanish Valley	Unconsolidated and consolidated.
30	Blanding area	Consolidated.
31	Parowan Valley	Unconsolidated and consolidated.
32	Cedar Valley, Iron County	Unconsolidated.
33	Beryl-Enterprise area	Do.
34	Central Virgin River area	Unconsolidated and consolidated.
35	Upper Sevier Valleys	Unconsolidated.
36	Upper Fremont River Valley	Unconsolidated and consolidated.

Table 2. Number of wells constructed and estimated withdrawal of water from wells in Utah
Number of wells constructed in 1998—Data provided by Utah Department of Natural Resources, Division of Water Rights.
Estimated withdrawal from wells—
1997 total: From Susong, Burden, and others (1998, table 2).

Area	Number of wells constructed in 1998			Estimated withdrawal from wells (acre-feet)					
				1998					1997
	Number in figure 1	Total	Diameter of 12 inches or more	Irrigation	Industry	Public supply	Domestic and stock	Total (rounded)	Total (rounded)
Curlew Valley	3	2	1	29,100	0	180	100	29,000	36,000
Cache Valley	5	46	16	13,100	6,700	4,100	2,000	26,000	25,000
East Shore area	9	5	0	24,000	3,300	23,900	5,000	56,000	62,000
Salt Lake Valley	10	13	4	2,400	[1]19,500	77,900	22,000	122,000	123,000
Tooele Valley	12	36	6	[2]15,000	800	3,200	780	20,000	25,000
Utah and Goshen Valleys	16	78	16	33,200	5,800	26,700	20,200	86,000	96,000
Juab Valley	21	5	0	10,200	180	[3]1,100	400	12,000	15,000
Sevier Desert	24	9	0	5,500	3,900	1,200	1,000	12,000	17,000
Central Sevier Valley	22	[4]33	[4]2	15,700	170	2,400	2,000	20,000	20,000
Pahvant Valley	23	5	1	64,400	[5]550	550	100	66,000	67,000
Cedar Valley, Iron County	32	24	16	30,600	50	4,300	700	36,000	34,000
Parowan Valley	31	4	3	[6]27,700	120	90	250	28,000	25,000
Escalante Valley									
Milford area	26	6	6	32,700	[7]7,200	840	260	41,000	52,000
Beryl-Enterprise area	33	18	9	72,300	670	400	830	74,000	81,000
Central Virgin River area	34	2	1	2,200	70	17,900	250	20,000	18,000
Other areas[8,9]		365	51	50,500	11,600	29,700	7,300	99,000	107,000
Total (rounded)		651	132	429,000	61,000	194,000	63,000	747,000	803,000

[1] Includes some use for air conditioning, 2,960 acre-feet, of which 2,380 acre-feet was injected back into the aquifer.
[2] Includes some domestic and stock use.
[3] Includes some industrial use.
[4] Includes wells constructed in upper Sevier Valley and upper Fremont River Valley.
[5] Withdrawal for geothermal power generation. About 85 percent was injected back into the aquifer.
[6] Includes some stock use.
[7] Withdrawal for geothermal power generation. About 99 percent was injected back into the aquifer.
[8] Withdrawal totals are estimated minimum. See “Other areas” section of this report for withdrawal estimates for other areas.
[9] Includes withdrawals for upper Sevier Valley and upper Fremont River Valley that were included with central Sevier Valley in reports prior to number 31 of this series.

Table 3. Total annual withdrawal of water from wells in significant areas of ground-water development in Utah, 1988-97
[From previous reports of this series]

Area	Number in figure 1	Thousands of acre-feet										1988-97 average (rounded)
		1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	
Curlew Valley	3	34	29	43	37	44	35	41	31	39	36	37
Cache Valley	5	33	30	32	29	36	23	31	23	24	25	29
East Shore area	9	68	61	65	68	59	56	60	53	57	62	61
Salt Lake Valley	10	165	157	143	135	138	116	142	120	138	123	138
Tooele Valley	12	26	27	33	30	30	22	31	26	23	25	27
Utah and Goshen Valleys	16	113	121	129	124	141	89	114	77	99	96	110
Juab Valley	21	22	28	27	25	29	20	26	13	19	15	22
Sevier Desert	24	15	17	34	34	33	31	37	18	17	17	25
Central Sevier Valley[1]	22	17	18	18	18	19	19	20	20	21	20	19
Pahvant Valley	23	71	82	88	74	86	87	93	69	83	67	80
Cedar Valley, Iron County	32	20	28	30	34	34	33	34	31	35	34	31
Parowan Valley	31	20	29	31	32	31	28	30	24	29	25	28
Escalante Valley												
Milford area	26	40	46	48	54	42	50	61	48	52	52	49
Beryl-Enterprise area	33	88	85	86	79	72	78	86	70	92	81	82
Central Virgin River area	34	18	23	22	15	14	13	14	15	17	18	17
Other areas		95	100	111	111	120	94	113	97	113	107	106
Total		845	881	940	899	928	794	933	735	858	803	862

[1] Prior to 1991, included upper Sevier and upper Fremont River Valleys.